LIFE HISTORY NOTES ON *LITHOPHANE SUBTILIS* (NOCTUIDAE)

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For several years lepidopterists of southern California have been collecting specimens of a *Lithophane* which was suspected as being close to *L. lemmeri,* but seemed sufficiently different superficially to warrant a subspecific name.

Examples were submitted to Dr. John Franclemont, who was revising the genus. Upon a more thorough study of a long series, the result was that he has described the southern California entity as a new species, *Lithophane subtilis,* in the paper which precedes these notes.

Henne was successful in obtaining larvae from *Juniperus californica* Carr., in 1964, and subsequently secured ova from imagos taken in the Juniper Hills, Los Angeles County, elevation 3,500 feet, which he and Comstock reared to maturity. Joint efforts have resulted in the following:

Egg: (Figures A and B).

Hemispherical, top rounded, base flattened; width, 1.4 mm; height, 1.0 mm; bright yellow with a circlet or belt of red-brown dots running completely around the middle, a few dots of the same color in the micropylar depression.

Approximately 30 ridges running from base toward micropyle, only 6 or so reaching micropylar margin; others gradually pinching out in upper third of egg. The ridges with roughened edges, but not the clearly defined pearl-like knobs of echinoid eggs of many other species. Troughs between these ridges with low, poorly defined cross-striations. Micropyle, small, and deeply depressed, irregularly brown-spotted in and around it. This, and the red-brown 'belt' widely variable.

Eggs laid January 16 hatched February 19 to 22.

First Instar Larva: (Figure C).

Length, 3 mm.

Head: Width, 0.75 mm; dull orange-yellow, smooth and glistening, bearing minute hyaline nodules, topped by translucent setae; ocelli, black or gray; mouth parts slightly darker.

Body: Velvety pale green, cervical shield glistening. First segment slightly wider than head, remaining segments regularly narrower. Each segment with minute black nodules bearing short translucent setae, those of thoracic segments chiefly in transverse lines across the segments. Caudal segments tinged with yellow. Legs, gray-black distally, shading to green proximally; prolegs concolorous with body.

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Moulting occurred March 3 to 5.

SECOND INSTAR: (Figure D).

Two surviving larvae measured 6 mm. and 8 mm. respectively.

Head: Width, 1 mm; uniform glistening olive-green, including ocelli; tips of ocelli slightly darker; mandibles tinged with brown.

Body: Green, paler than head, except prothoracic shield same shade as head; head slightly wider than body, latter tapering toward cauda but not as noticeably as with first instar; body segments crossed transversely by ridges bearing minute colorless setae along their crests, each arising from a minute black papillus. Segment 11 with a prominent dorsal hump. Legs, black distally, green proximally; prolegs concolorous with body; spiracles inconspicuous, narrowly black rimmed.

THIRD INSTAR:

Length, March 27, approximately 11 mm.

Head: Width, 1.7 mm; glistening green with slightly yellowish tinge; ocelli tipped with brown; mouth parts shaded brown.

Body: Ground color pale green; middorsally a longitudinal line of greenish-white spots, each spot placed anterior to a segmental juncture; laterally, a longitudinal line of larger dark green spots, each on a protruding base; lateral thereto a poorly defined longitudinal greenish-white line, bordered latero-ventrally by another parallel line of dark green raised spots; subspiracularly another poorly defined greenish-white longitudinal line. Legs, black distally, green proximally; prolegs, bright green. Setae so short as to be barely discernible.

FOURTH INSTAR:

Two larvae, length 15 mm. and 20 mm. respectively. April 6.

Head: Width, 3 mm; green, adfrontals paler; ocelli, pale green; front a shade darker green; mandibles tinged with brown.

Body: Ground color, deep green; middorsally a line of large arrow-shaped yellow figures, pointing cephalically and centered on a segmental juncture. Dorsolaterally a zig-zag yellow band extending the length of the body; subspiracularly, another similar band. Spiracles small, black, each margined with a circlet of yellow. Legs, yellow-green with black tips; prolegs, mottled yellow-green; crochets, brownish-yellow. Venter, mottled yellow-green.

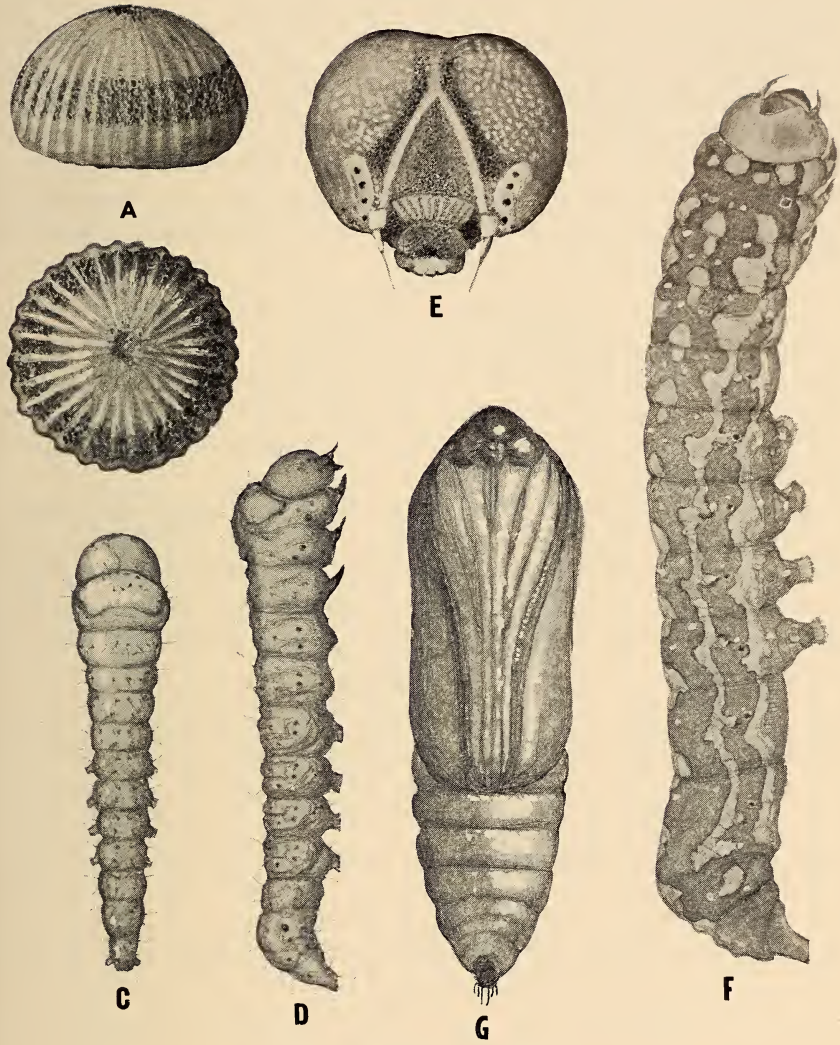
MATURE LARVA: (Figure F).

Length approximately 25 mm.

Head: (Figure E), width 5.5 mm. Adfrontal sutures and antennae white; ocelli dark brown, resting on a pale crescentic field; remainder of head pale green, with round paler green blurred dots.

Body: Supraspiracular and subspiracular longitudinal yellowish-white lines more boldly developed, as shown in the figure. Otherwise, much as in preceding instar.

Pupation occurred May 11, on the floor of the rearing cage, in a compact cocoon, into which fragments of bark, foliage and debris covered an inner lining of white silk.



Explanation of Plate

Lithophane subtilis Franclemont. Figs. A and B. Egg, superior and lateral surfaces. C. First instar larva, dorsal aspect. D. Second instar larva, lateral aspect. E. Head of mature larva, frontal aspect. F. Mature larva, lateral aspect. G. Pupa, ventral aspect. All figures enlarged.

Reproduced from water color drawings by J. A. Comstock.

PUPA: (Figure G).

Length, 22 mm.; greatest width, 6.5 mm.

Texture, smooth and glistening. Maxillae reach to wing margins; antennae slightly shorter; segmental junctures well defined; cremaster a small black knob with two black shafts having recurved tips, and two pairs of yellow, short and slender spicules. Body color, yellow-brown, shading to black over head, antennae and cauda.

A six month period passed before an imago emerged, October 29, 1964. Many more adults were reared in our desert laboratory, some of which are included in the type series.

GEOGRAPHICAL DISTRIBUTION

At present, the recorded range of *L. subtilis* is that recorded for the type series, and includes only the areas in Los Angeles and Riverside counties where the host plant, *Juniperus californica* occurs. It probably will be found in semi-desert juniper territory both northward and southward from its present known locus.

In 1943 the authors published a life history of *"Graptolitha longier"* based on larvae taken in Smokey Valley, XYZ Creek, Tulare County, California, at an elevation of 6,200 feet, on *Juniperus occidentalis* Hook. In comparing this record with that of *subtilis*, the suspicion arises that the presumed *longior* was actually the subsequently designated *Lithophane subtilis*.

LITERATURE CITED

COMSTOCK, JOHN ADAMS and CHRISTOPHER HENNE, 1943. Mature Larva of *Graptolitha longior* Sm. Bull. So. California Acad. Sci., 42 (3): 132.

AN APPARATUS FOR MEASURING MACULATION PATTERNS

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The application of numerical analytic techniques to external morphological patterns in the Insecta is providing important taxonomic information (Mason, Ehrlich, and Emmel, 1967; Procaccini and Marks, 1966). In certain insect groups with relatively tough anatomical parts (*i.e.*, Coleoptera, etc.) direct morphological measurements are feasible. But in the Lepidoptera direct measurements are usually not possible because